ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 4, Issue 3, pp: (1-4), Month: July - September 2016, Available at: www.researchpublish.com

A Short Review of Land Configuration to Improve the Plant Growth, Development and Yield of Cereals

[1]S. P. Deshmukh, [2]Jayesh Vasave, [3]A. M. Patel

Assistant Research Scientist, Navsari Agricultural University, Navsari, India

Abstract: **Land configuration is the prime work for better growth and development of any crop. Cereals contribute to the largest area under cultivable crops in India and worldwide. Land configuration decides the effectiveness of the crop management practices regarding application of nutrient, irrigation, weed management, etc. Major land configuration practices includes raised bed preparation, rides and furrows, broad bed furrows, etc. The general farmer's practice sowing over flatbed without any proper land configuration, leading to less significant growth and development of crops and in turn lesser yields. Therefore, it is necessary to know about the suitable land configuration for proper growth and development of crops especially cereals. Proper land configuration according to the climatic conditions of the region viz., heavy rainfall area or drought prone areas or area with salinity hazards will act as management practice to the crop.**

Keywords: **Plant Growth, Land configuration.**

1. INTRODUCTION

The productivity of any crop is the complex phenomenon governed by number of factors viz., use of improved varieties, appropriate sowing method, timely sowing, spacing, judicious use of water as well as nutrients and weeds, pests and disease management. Among all these, appropriate sowing method or proper land configuration is the most critical factor for realizing desired yield potential. The genotypes can express their full potential only when grown under optimum conditions and at optimum plant base.

Land management system plays a major important role in minimizing soil erosion and improving water use efficiency of field crops. Easy and uniform germination as well as growth and development of plant are provided by manipulation of sowing method. Land configuration increases water use efficiency as reported by Chiroma et al. (2008) and also increases availability of nutrients to crops. It is particularly useful in areas having saline irrigation water because it helps to avoid direct contact of young plants with saline irrigation water. The superiority of ridges and furrow system could be ascribed to proper drainage of excess water coupled with adequate aeration at the time of irrigation or heavy rainfall. Parihar et al. (2009) reported that ridges and furrow sowing method improved grain as well as stover yield of pearlmillet and succeeding mustard over the flat bed method of sowing.

In attempt has, therefore, been made in this paper to review the research works carried out on this aspect in Gujarat, India and abroad under appropriate heads.

2. EFFECT ON GROWTH CHARACTERS

Halepyati and Hosamani (1991) studied the growth of sorghum as influenced by land shaping method in sorghum based cropping system and they observed that highest leaf area index and dry matter of sorghum were recorded in furrows than flat bed land shaping. Ugale et al. (1995) at MPKV, Rahuri conducted a experiment for evaluating performance of

different sowing methods of pearlmillet during two consecutive kharif seasons of 1989 and 1990 and observed that plant height and number of tillers/plant were increased when grown on ridges and furrow method as compared to flat bed method.

While studying the effect of moisture conservation techniques on growth of rainfed rabi sorghum Kolekar et al. (1998) found that growth contributing characters like plant height, leaf area index and dry matter per plant were favourably affected by ridges and furrow technique than all other techniques. Patil and Sheelavantar (2000) conducted a field experiment during rabi season at Regional Research Station, Bijapur, Karnataka on sorghum and found significant increase in grain and straw yields as well as water use efficiency with the ridges and furrow than flat bed. Jadhav and Shelke (2007) while studying the effect of land configuration in maize found that mean total dry matter yield was significantly higher with ridges and furrow land configuration than flat bed.

Chiroma et al. (2008) conducted an experiment in semi-arid areas of North-East Nigeria to compare the relative efficacy of open ridges, tied ridges, pit planting, and flat bed method. They found that pearlmillet plants recorded more height with open ridges, tied ridges and pit planting compared to flat bed. Kiran et al. (2008 b) found increase in plant height and total dry matter production of rabi sorghum with ridges and furrow method over flat bed method while studying the effect of in situ moisture conservation practices.

Kumar (2008) studied the growth of maize under varying planting methods viz. flat bed and modified bed (ridges and furrow). He found that maize crop plants grown on modified bed treatment showed significant increase in plant height and effective number of tillers/plant.

3. EFFECT ON YIELD AND YIELD ATTRIBUTES

Patil and Bangal (1989) conducted an experiment at M.P.K.V., Rahuri during kharif season to evaluate the effect of soil conservation practices on yield of pearlmillet and they obtained higher yields of grain and fodder in contour ridges and graded ridges as compared to plain plots. An experiment was conducted by Bhagwandin and Bhatia (1990) to study the effect of sowing methods on intercropping of blackgram with maize under rainfed condition at Kanpur. They observed that ridges and furrow method of sowing was found productive than flat bed sowing as it gave significantly higher 100-grain weight and yield of maize.

Halepyati and Hosamani (1991) studied influence of land shaping method in sorghum based cropping system and they recorded higher grain yield (38.58 q/ha) of sorghum in furrows than flat bed. While during the rainy season at New Delhi with pearlmillet (Bk. 566-230) sown on flat seed bed, ridges and furrow seed bed, bunded seed bed and observed that sowing in ridges and furrow produced highest grain yield of 1.32 t/ha (Kaushik and Gautam, 1994).

Ugale et al. (1995) at M.P.K.V., Rahuri conducted experiment during kharif season of 1989 and 1990 and evaluated performance of different sowing methods on pearlmillet. They found that length and girth of earhead was increased with ridges and furrow method which ultimately increased the grain yield by 6 and 30 per cent and fodder yield by 4 and 24 per cent, during both the years, respectively over normal method. While at Rahuri, studying the effect of moisture conservation techniques on yield of rainfed rabi sorghum Kolekar et al. (1998) found significantly highest grain and fodder yield with ridges and furrow than all other techniques including flat bed.

A field investigation was carried at the Dry Farming Research Station, Solapur by Pawar et al. (1999) and recorded higher grain and stover yields of rabi sorghum in ridges and furrow plots than flat bed. Selvaraju et al. (1999) conducted a field experiment at Coimbatore on Alfisols and Vertisols of southern peninsular India and found that tied ridges stored 14 per cent more soil water and produced 14 per cent and 11 per cent higher grain and straw yield of pearlmillet, respectively, than flat bed method.

Patil and Sheelavantar (2000) while studying yield of rabi sorghum as influenced by in situ moisture conservation practices, found that ridges and furrow method improved the yield components significantly over flat bed due to increase in availability of moisture and nutrients.

Bhat and Mahal (2006) reported that bed planting significantly increased the earhead length and test weight which gives higher yield of grain and straw over flat planting in wheat at Punjab Agricultural University, Ludhiana. However, the effect of land configuration in maize found that grain yield was significantly higher in ridges and furrow land configuration than flat bed (Jadhav and Shelke, 2007).

Bhale et al. (2008) conducted an experiment at M.A.U., Parbhani with three land configurations to study resource conservation technologies to enhance productivity of soybean (Glycine max) – rabi sorghum (Sorghum bicolor) sequence at Parbhani (M.H.). They found that opening of furrow in each row of soybean and sorghum recorded significantly higher soybean as well as sorghum yield as compared to broad bed and furrow and ridges and furrow land configuration.

Kumar (2008) studied the yield and water use efficiency of maize under varying planting methods viz. flat bed and modified bed (ridges and furrow). He found that crop plants grown on modified bed increased 1000 grain weight, grain yield and water use efficiency. Patel et al. (2008) studied the effect of land configuration in rabi sorghum at NAU, Navsari and obtained significantly higher grain (3.44 t/ha) and fodder (9.3 t/ha) yields under ridges and furrow method of sowing and the same was lowest in flat bed (2.45 t/ha and 7.70 t/ha, respectively). Parihar et al. (2009) at I.A.R.I., New Delhi conducted a field experiment to evaluate influence of land configuration on crop productivity of pearlmillet (Pennisetum glaucum L.) intercropped with Indian mustard (Brassica juncea) and found that the ridges and furrow sowing recorded higher grain yield (2.62 t/ha) over the flat bed method (2.33 t/ha).

4. EFFECT ON NUTRIENT CONTENT AND UPTAKE

Kiran et al. (2008 a) conducted a field experiment at Main Agricultural Research Station, Dharwad on rabi sorghum and found higher N content and uptake in leaf, stem and grains of sorghum grown on ridges and furrow method as compared to flat bed. Parihar et al. (2009) at I.A.R.I., New Delhi recorded high total N and P uptake in ridges and furrow method of sowing (90.39 kg/ha and 34.39 kg/ha, respectively) than the flat bed method (78.24 kg/ha and 29.45 kg/ha, respectively).

From a field experiment conducted during kharif season at Navsari by Dhimmar and Damame (2010) recorded higher uptake of N and P with ridges and furrow method than all other treatments.

5. EFFECT ON ECONOMICS

Bhale et al. (2008) while working at the M.A.U., Parbhani on resource conservation technologies to enhance productivity of soybean (Glycine max) – rabi sorghum (Sorghum bicolor) sequence observed that highest net monetary returns of Rs.3737/ha were secured from ridges and furrow treatment than flat bed treatment.

Kiran et al. (2008 b) conducted a field experiment at the Main Agricultural Research Station, Dharwad on rabi sorghum and recorded 49.47 per cent higher net returns from sorghum grown in ridges and furrow method as compared to flat bed. Parihar et al. (2009) at I.A.R.I., New Delhi in pearlmillet (Pennisetum glaucum L.) and Indian mustard (Brassica juncea) intercropping found higher B:C ratio (2.28) and net return (Rs.24490/ha) under ridges and furrow method than flat bed method having 2.11 B:C ratio and Rs.21078/ha net returns.

6. CONCLUSION

According to the whole research studied in the area of land configuration towards the cereals, it may be stated that use of appropriate land configuration, especially ridges and furrow supports the growth and development of cereal crops along with increase in the economic gains.

REFERENCES

[1] Bhagwandin and Bhatia, K.S. (1990). Effect of sowing methods and mulching on the intercropping of blackgram with maize under rainfed conditions. Crop Res., **3** (2): 284-286.

[2] Bhale, V.M.; Patil, B.K. and Farkade, B.K. (2008). Resource conservation technologies to enhance productivity of soybean (Glycine max)-rabi sorghum (Sorghum bicolor) sequence.In: National symposium on “New Paradigms in Agronomic Research”, Nov., 19-21, 2008 held at Navsari Agriculture University, Navsari, Gujarat Pp-252-253.

[3] Bhat, M.A. and Mahal, S.S. (2006). Performance of wheat (Triticum aestivum L.) genotypes under different planting and weed control methods. Crop Res., **32** (2): 153-156.

[4] Chiroma, A.M.; Alhassan, A.B. and Khan, B. (2008). Yield and water use efficiency of millet as affected by land configuration treatments. J. of Sustainable Agric., **32** (2): 321 – 333.

[5] Dhimmer, S.K. and Damame, H.S. (2010). Response of kharif cowpea to land configuration and bio-fertilizers under South Gujarat condition. State level seminar on "Organic Farming"-2010, Navsari, Gujarat. Pp- 172-173.

[6] Halepyati, A.S. and Hosamni, S.A. (1991). Growth and yield of sorghum (Sorghum bicolor) as influenced by date of sowing and land-shaping method in sorghum-based cropping systems. Indian Journal of Agronomy, **36** (4): 593-594.

[7] Jadhav, V.T. and Shelke, D.K. (2007). Effect of land configurations and fertilizer levels on the distribution of dry matter and yield in maize hybrids. J. Maharashtra agric. Univ., **32** (3): 314-316.

[8] Kaushik, S.K. and Gautam, R.C. (1994). Response of rainfed pearlmillet to water harvesting, moisture conservation and plant population in light soils. Indian J. agric. Sci., **64**: 858-860.

[9] Kiran, J.A.; Lingaraju, B.S. and Ananda, N. (2008 a). Influence of in situ moisture content, yield and nutrient uptake of rabi sorghum under rainfed condition. Crop Res., **35** (1 and 2): 8-12.

[10] Kiran, J.A.; Lingaraju, B.S. and Ananda, N. (2008 b). Effect of in situ moisture conservation practices and nitrogen levels on growth, yield and economics of rabi sorghum under rainfed condition. Crop Res., **35** (1 and 2): 13-16.

[11] Kolekar, P.T.; Umrani, N.K. and Indi, D.V. (1998). Effect of moisture conservation techniques and nitrogen on growth and yield of rainfed rabi sorghum. J. Maharashtra agric. Univ., **23** (1): 26-28.

[12] Kumar, A. (2008). Growth, yield and water use efficiency of different maize (Zea mays)-based cropping systems under varying planting methods and irrigation levels. Indian J. agric. Sci., **78** (3): 244-247.

[13] Parihar, C.M.; Rana, K.S. and Parihar M.D. (2009). Crop productivity, quality and nutrient uptake of pearlmillet (Pennisetum glaucum) and Indian mustard (Brassica juncea) cropping system as influenced by land configuration and direct and residual effect of nutrient management. Indian J. agric. Sci. **79** (11): 927-930.

[14] Patil, P.P. and Bangal, G.B. (1989). Yield of pearlmillet in relation to soil conservation practices. J. Maharashtra agric. Univ., **14** (2): 184-186.

[15] Patil, S.L. and Sheelavantar, M.N. (2000). Yield and yield components of rabi sorghum (Sorghum bicolor) as influenced by in situ moisture conservation practices and integrated nutrient management in vertisols of semi-arid tropics of India. Indian Journal of Agronomy, **45** (1): 132-137.

[16] Pawar, R.B.; Patil, J.D. and Takate, A.S. (1999). In situ moisture conservation techniques for rabi sorghum production under dryland condition. J. Maharashtra agric. Univ., **24** (2): 214.

[17] Selvaraju, R.; Subbian, P.; Balasubramanian, A. and Lal, R. (1999). Land Configuration and soil nutrient management options for sustainable crop production on Alfisols and Vertisols of southern peninsular India. Soil and Tillage Res., **52** (3-4): 203-216.

[18] Ugale, S.D.; Wani, A.G.; Patil, B.D. and Bhingrde, M.T. (1995). Performance of different sowing methods of pearlmillet on lighter type of soils under rainfed conditions. J. Maharashtra agric. Univ., **20** (2): 311-312.